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Adapting C2 to the 21st Century

Title of paper
Perceptual Based Visualization Techniques for Improving Ground Situation
Picture Understanding

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Abstract

Military commanders require timely and accurate awareness of the ground situation in their respective areas of responsibility. With increasing use of sensor networks in the battlefield, large volumes of data will have to be processed. Constraints in human working memory make people inherently poor at eliminating duplicates, resolving conflicts and correlating large continuous streams of data across time and space. Data fusion decision support systems have been developed to process large amounts of raw data and present the fused results. This reduces the cognitive load on the human and facilitates subsequent decision-making.

Although, humans are inherently poor at analyzing large volumes of information, hypothetically, by presenting and organizing situation information graphically according to the principles of human perception, more information can be put on to the display and yet enable rapid one glance situation understanding.

We postulate that with the creation of novel information visualization techniques inspired from human perception, commanders will be better informed of the interpretation by the fusion engine enabling commanders to consider and formulate alternative interpretations of the ground situation picture by interacting with the visualizations. Situation assessment will then improve as commanders actively consider both given and alternative interpretations. Commanders are brought back into the situation assessment loop; human cognitive prowess will be brought to bear, together with advanced data fusion algorithms, to make sense of the situation.

This paper describes work done in the application of established principles of human visual perception and graphic design, for the development of novel 3D perceptual visualizations for an existing multi-source fusion engine to augment commanders' understanding of the ground situation picture. The work also illustrates that is it possible to rapidly amplify cognition (i.e. better situation understanding) when perceptual visualizations are coupled with advanced fusion systems.